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SOVIET STANDARD FOR DETERMINING
THE CONTENT OF ETHYL FLUID IN ETHYL GASOLINES
(GOST 63-40)

Field of Application

This method is applicable for acceptance and umpire analyses.

Equipment

Graduate (50 ml)
Erlenmeyer flask (250 ml)
Glass tube (60-70 cm long), with stopper
Schott filter or porcelain funnel with paper filter
Bunsen eudiometer
Water-jet pump
Burette (25 ml)

Reagents

Alcoholic solution of iodine, 1 N
Ethyl alcohol, distilled
Ammonium acetate
Ammonium molybdate, 0.02 N
Solution of tannin
Paraffin sheet

Preparation of Reagents

To prepare alcoholic solution of iodine, dissolve 127 g of freshly sublimated crystalline iodine in 700-800 ml of distilled ethyl alcohol, bring volume to one liter, and mix thoroughly.

Ammonium acetate is prepared by mixing 95 ml of a 25% solution of ammonia with 100 ml of an 80% solution of acetic acid and 125 ml of water.

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The tannin solution is prepared by dissolving 0.3 g of tannin in 100 ml of water. Solution is prepared immediately prior to analysis.

The solution of ammonium molybdate is prepared by dissolving 1.96 g of ammonium molybdate $(NH_4)_2MoO_4$ in water and bringing volume of solution to one liter.

To determine the titer of the solution, dissolve 0.08-0.12 g of recrystallized lead chloride in 25 ml of hot ammonium acetate solution. Heat solution to boiling and titrate with 0.02 N solution of ammonium molybdate. End of titration is determined by drop reaction on tannin as follows: place one drop of tannin solution on the paraffin sheet; then, with a glass rod, take one drop of the titrated solution from the flask and place it on the drop of tannin; scarcely notable yellow coloration of the drop of tannin indicates the end of the reaction, after which titration is ended.

The titer of the ammonium molybdate is calculated by the formula:

$$T = 1.1628 \frac{a}{b}$$

where a -- weighed-in quantity of lead chloride in grams
b -- milliliters of ammonium molybdate used in the titration
T -- titer of the ammonium molybdate with reference to tetraethyl lead (quantity of tetraethyl lead in grams equivalent to quantity of ammonium molybdate in one milliliter of solution).

Test Procedure

Place 50 ml of gasoline in Erlenmeyer flask, add 10-15 ml of alcohol solution of iodine, and close flask with a stopper through which has been inserted a glass tube for the condensation of vapors.

Place flask on asbestos wire net and boil gently for 15 minutes, shaking frequently. Cool flask and filter solution. Wash the PbI_2 precipitate on the filter and in the flask three or four times with ethyl alcohol and then dissolve in ammonium acetate, collecting the resulting solution in the flask from which the mixture had been filtered. Dilute solution with water to 100 ml, heat to boiling, and titrate with 0.02 N solution of ammonium molybdate.

End of titration is determined by the drop test on tannin.

Conduct two parallel determinations.

Method of Calculation

The amount of tetraethyl lead, in milliliters, contained in one kilogram of the gasoline tested is determined by the formula:

$$X = \frac{20 \cdot T \cdot a}{1.6492 \cdot d}$$

where T -- titer of 0.02 N ammonium molybdate solution with reference to tetraethyl lead
a -- amount of ammonium molybdate, in milliliters, used in titration
d -- specific gravity of gasoline at temperature of experiment
1.6492 is the specific gravity of tetraethyl lead

To convert the tetraethyl lead content to milliliters of ethyl fluid per kilogram of gasoline, multiply by 2 the number of milliliters of tetraethyl lead obtained, considering that the ethyl fluid contains 50% by volume of tetraethyl lead.

Accuracy of Determination

The difference between the two parallel determinations must not exceed 1%.

The difference between the data of the two separate analyses must not exceed 1.5%.

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